III. REMARKS

The claims have been amended to better conform to US practice.

Claims 17 and 21 comply with 35 USC 112, first paragraph.

In general, the standard for disclosure as set forth by the Supreme Court is that the applicant, "...may begin at the point where his invention begins and describe what he has made that is new, and what it replaces of the old. That which is common and well known is as if it were written out in the patent and delineated in the drawings." (*Webster Loom Co. v. Higgins*, 105 US 580). Further, a "patent need not teach and preferably omits what is well known in the art." (*Hybritech Inc. v. Monoclonal Antibodies Inc.*, 231 USPQ 81, 94, CAFC 1986)

Here the Examiner admits in section 2 of the office action that the functions recited in claims 17 and 21 are disclosed in the application. It is submitted that computer program products *per se* are common and well known. Thus it is as if they were written out in the description. A person of ordinary skill in the art would therefore be able to make and use the claimed product by combining the prior art with the present invention.

Hence, the rejection of claims 17 and 21 should be withdrawn.

Claims 1, 6, 7, 8, 10, 11, 12, 13, 14, and 16 are not unpatentable under 35 USC 102(e) as being anticipated by Hosur.

Claim 1 recites, "..enabling a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of each frame." The remaining rejected independent claims have similar limitations.

It is respectfully submitted that Hosur fails to disclose these limitations for the reasons indicated below:

1. Continuously transmitting through 2 antennas does not enable separating their corresponding transfer functions.

This is a main fact that applicants have pointed out in previous responses. If there are two transmission antennas and both emit symbols in unison, it is not possible for the receiver to differentiate between channel 1 (connecting the first transmission antenna to the receiver) and channel 2 (connecting the second transmission antenna to the receiver). The receiver may notice that there are two transmission antennas, but it can not tell, whether A is A and B is B, or whether actually A is B and B is A.

2. When two antennas both transmit, none of them is the one to start the pattern.

This is actually a consequence of the principal fact considered in point 1 above. In the applicants' claims the need to have at least some unique transmission turns for the antennas is stated by reciting "starting the transmission of the sequence of symbols from a predefined antenna". Hosur does not start his transmission from a predefined antenna (in singular); it always starts its transmission from two (or more) antennas simultaneously.

3. Hosur actually just copies the transmission schedule of the previously cited Alamouti reference, with some additional filling.

One may compare the way in which Hosur composes its transmissions to what Alamouti does. According to Alamouti, there are the following transmitted symbols (first four columns of Table 1 in Alamouti):

		symb.p. 1		symb.p. 2		symb.p. 3		symb.p. 4
Ant. 1:		s_0		$-s_1^*$		s_2		$-s_3^*$
Ant. 2:		s_1		s_0^*		s_3		s_2^*

The empty columns in the table above are there in order to facilitate easier comparison to Hosur. Note that in order to produce a comparable table, one may read the completely equal representation in the center part of Fig. 2 in Hosur, or one may re-order the appropriate entries taken from Table 1 in Hosur. According to Hosur, there are the following transmitted symbols (seen in the center part of Fig. 2 as well as first two lines of Table 1 in Hosur, rearranged):

	symb.p. 1 of slot 1	symb.p. 2 of slot 1	symb.p. 3 of slot 1	symb.p. 4 of slot 1	symb.p. 1 of slot 2	symb.p. 2 of slot 2	symb.p. 3 of slot 2	symb.p. 4 of slot 2
Ant. 1:	11	$\mathbf{s_1}$	11	$\mathbf{s_2}$	11	$\mathbf{s_1}$	11	$\mathbf{s_2}$
Ant. 2:	11	$\mathbf{-s_2^*}$	00	$\mathbf{s_1^*}$	11	$\mathbf{-s_2^*}$	00	$\mathbf{s_1^*}$

In order to compare Hosur to Alamouti, first ignore those columns where the 11's and 00's appear. In Alamouti, antenna 1 transmits first s_0 and then $-s_1^*$. At the same time, antenna 2 transmits first s_1 and then s_0^*. In other words, what antenna 2 transmits first is the negative complex conjugate of what antenna 1 transmitted second. Correspondingly what antenna 2 transmitted second is the complex conjugate of what antenna 1 transmitted first.

In Hosur, what antenna 2 transmits first is the negative complex conjugate of what antenna 1 transmitted second. Correspondingly what antenna 2 transmitted second is the complex conjugate of what antenna 1 transmitted first. This ***exactly the same thing as in Alamouti***. Whether one uses a straight notation (like s_1) for the first transmission of antenna 2 and $-s_1^*$ for the second transmission of antenna 1, like Alamouti does, or whether the notations are the other way round like in Hosur, does not matter. It is the symbol content that matters, and it shows unequivocally that Hosur uses an exact copy of Alamouti for his S symbols, and only fills in with 11's and 00's in every second symbol period. It is straightforward to draw the consequence that the disclosure of Hosur can achieve little more than that of Alamouti.

4. Mathematical proof shows that also Hosur the channel estimates are undistinguishable.

First of all, applicants wish to point out a small mistake in Hosur: equation [8] in Hosur should read as follows:

$$R_j^4 = \alpha_j^1 S_2 + \alpha_j^2 S_1^* \qquad [8]$$

In other words, the subscript of the first S is two, not one as erroneously appears in Hosur. This is easy to see, *e.g.,* in Fig. 2, because what the first antenna transmits in the fourth symbol period is S2 and not S1.

Now, examine what equations [11] and [12] in Hosur quite appropriately show about the operation of the phase correction circuit of Fig. 3. In the following one writes out also the intermediate results that help to understand how the results of equations [11] and [12] are derived. Note that in making the replacement for R_j^{4*} in [11] and R_j^4 in [12] one must use the correct form of equation [8] above, not the incorrect one printed in column 5 of Hosur. Equation [11] tells what will appear at the output of the combiner 316:

$$\begin{aligned} & R_j^2 \alpha_j^{1*} + R_j^{4*} \alpha_j^2 \\ &= \left(\alpha_j^1 S_1 - \alpha_j^2 S_2^*\right)\alpha_j^{1*} + \left(\alpha_j^{1*} S_2^* + \alpha_j^{2*} S_1\right)\alpha_j^2 \\ &= \left(\alpha_j^1 \alpha_j^{1*}\right)S_1 - \left(\alpha_j^{1*} \alpha_j^2\right)S_2^* + \left(\alpha_j^{1*} \alpha_j^2\right)S_2^* + \left(\alpha_j^2 \alpha_j^{2*}\right)S_1 \\ &= \left(\left|\alpha_j^1\right|^2 + \left|\alpha_j^2\right|^2\right)S_1 \end{aligned} \qquad [11]$$

Similarly equation [12] tells one what will appear at the output of the combiner 320:

$$\begin{aligned} & -R_j^{2*} \alpha_j^2 + R_j^4 \alpha_j^{1*} \\ &= \left(-\alpha_j^{1*} S_1^* + \alpha_j^{2*} S_2\right)\alpha_j^2 + \left(\alpha_j^1 S_2 + \alpha_j^2 S_1^*\right)\alpha_j^{1*} \\ &= -\left(\alpha_j^{1*} \alpha_j^2\right)S_1^* + \left(\alpha_j^2 \alpha_j^{2*}\right)S_2 + \left(\alpha_j^1 \alpha_j^{1*}\right)S_2 + \left(\alpha_j^{1*} \alpha_j^2\right)S_1^* \\ &= \left(\left|\alpha_j^1\right|^2 + \left|\alpha_j^2\right|^2\right)S_2 \end{aligned} \qquad [12]$$

What one sees here, and what could just as well be seen in the original equations [11] and [12] of Hosur, is that again both results are completely symmetrical in terms of the transfer functions (which Hosur calls the Rayleigh fading terms) α_j^1 and α_j^2. One may even make an experiment: what would happen if the receiver had confused the transfer functions, *i.e.*, used α_j^2 instead of α_j^1 and *vice versa*. Thus switching them in the derivations above one obtains:

$$\begin{aligned}
&R_j^2\alpha_j^{2*} + R_j^{4*}\alpha_j^1 \\
&= \left(\alpha_j^2 S_1 - \alpha_j^1 S_2^*\right)\alpha_j^{2*} + \left(\alpha_j^{2*} S_2^* + \alpha_j^{1*} S_1\right)\alpha_j^1 \\
&= \left(\alpha_j^2\alpha_j^{2*}\right)S_1 - \left(\alpha_j^1\alpha_j^{2*}\right)S_2^* + \left(\alpha_j^1\alpha_j^{2*}\right)S_2^* + \left(\alpha_j^1\alpha_j^{1*}\right)S_1 \\
&= \left(\left|\alpha_j^1\right|^2 + \left|\alpha_j^2\right|^2\right)S_1
\end{aligned} \qquad [11']$$

and

$$\begin{aligned}
&-R_j^{2*}\alpha_j^1 + R_j^4\alpha_j^{2*} \\
&= \left(-\alpha_j^{2*} S_1^* + \alpha_j^{1*} S_2\right)\alpha_j^1 + \left(\alpha_j^2 S_2 + \alpha_j^1 S_1^*\right)\alpha_j^{2*} \\
&= -\left(\alpha_j^1\alpha_j^{2*}\right)S_1^* + \left(\alpha_j^1\alpha_j^{1*}\right)S_2 + \left(\alpha_j^2\alpha_j^{2*}\right)S_2 + \left(\alpha_j^1\alpha_j^{2*}\right)S_1^* \\
&= \left(\left|\alpha_j^1\right|^2 + \left|\alpha_j^2\right|^2\right)S_2
\end{aligned} \qquad [12']$$

This is exactly the same result as above. In other words, even if the receiver confused the transfer functions, it still obtains the same results at the outputs. This is in perfect conformity with what was said above about the symmetricity of the situation when two antennas transmit simultaneously.

The result is also easy to understand in the light of the fact that in making these derivations, Hosur never pays any attention to the fact that there are also the 11 and occasionally 00 symbols transmitted between the S symbols. Thus, Hosur derives its results using exactly the same symbol scheme as Alamouti – and quite unsurprisingly arrives at the very same result in terms of lacking anticipation of the applicants', claimed invention.

Exactly like in the Alamouti reference, the *apparently different* channel transfer functions α_j^1 and α_j^2 appear in Hosur, but only as conceptual aids that Hosur uses to show how its receiver works. In practical operation, the receiver can not make any difference concerning which of them is which, but this does not matter at all in Hosur because the combined results at the receiver are the same regardless of which way the selection was made. Thus, Hosur fails to anticipate the applicants' claimed invention.

Hence the rejection of the above claims under 35 U.S.C. 102(e) should be withdrawn.

Further, it is not obvious to modify Hosur to obtain the claimed invention so the above claims are unobvious over Hosur.

Claim 17 is not unpatentable under 35 USC 103(a) over Hosur.

Similarly, since claim 17 recites the above-discussed limitations, it is patentable for the reasons given above.

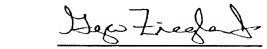
Thus the rejection of claim 17 should be withdrawn.

Claim 21 has not been rejected on prior art, but is also patentable for the reasons given above.

For all the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicant's attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,



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